

Cambridge International AS & A Level

Mathematics 9709

Paper 1 Pure Mathematics 1

Topic 6-Binomial Expansion

Question No (11)

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Question No (11)

- (i) Find the first 3 terms in the expansion of $(2 - y)^5$ in ascending powers of y .
- (ii) Use the result in part (i) to find the coefficient of x^2 in the expansion of $(2 - (2x - x^2))^5$.

Solution

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(i)

Binomial Expansion

$$(a+b)^n = {}^nC_0 a^n b^0 + {}^nC_1 a^{n-1} b^1 + {}^nC_2 a^{n-2} b^2 + \dots + {}^nC_n a^0 b^n$$

$$(2-y)^5$$

By using Binomial Expansion

$$(2-y)^5 = {}^5C_0 (2)^5 (-y)^0 + {}^5C_1 (2)^4 (-y)^1 + {}^5C_2 (2)^3 (-y)^2 + \dots$$

$$= 2^5 + 5(16)(-y) + \frac{5 \times 4}{2 \times 1} (8)(y^2)$$

$$(2-y)^5 = 32 - 80y + 80y^2$$

$$(ii) (2-(2x-x^2))^5$$

$$\text{let } 2x-x^2 = y$$

$$\Rightarrow (2-y)^5 = 32 - 80y + 80y^2 \quad \text{from (i)}$$

$$= 32 - 80(2x-x^2) + 80(2x-x^2)^2$$

$$= 32 - 160x + 80x^2 + 80(2x)^2 - 2(2x)(x^2) + x^4$$

$$= 32 - 160x + 80x^2 + 80(4x^2 - 4x^3 + x^4)$$

$$= 32 - 160x + 80x^2 + 320x^2 - 320x^3 + 80x^4$$

$$\text{terms containing } x^2 \quad 80x^2 + 320x^2 = 400x^2$$

coefficient 400, 400

